

A VISION FOR THE OBJECTIVE FORCE WARRIOR

Dr. A. Michael Andrews II, Dr. Pamela Beatrice,
Philip Brandler, and Roy Cooper

Introduction

Today's fully equipped warrior is too "heavy," and his lethality, power, survivability, mobility, and situational awareness are too limited to ensure overmatching capability in the warfighting environments anticipated during the next 20 years. To ensure that the Army remains "persuasive in peace and invincible in war," we must do more for our dismounted warrior. The Objective Force Warrior (OFW) is the answer.

The Objective Force Warrior is a bold initiative to provide a revolutionary capability for the dismounted warrior of the future. The impetus for this initiative is multifaceted:

- "Light forces must be more lethal, survivable and tactically mobile"—*Chief of Staff of the Army intent statement of June 1999*;
- "Soldiers—not equipment—are the centerpiece of our formation"—*The Army vision*;
- Mounted-enabled by dismounted and dismounted-enabled by mounted—*Unit of Action operations described in the Mission Need Statement for Future Combat Systems (FCS)*;
- "Provide enhancement to enable soldiers to conduct dismounted maneuver with load bearing equipment and load not to exceed 40 pounds"—*Statement of Required Capabilities, FCS*; and

- Operations in Afghanistan demonstrate the importance of the warfighter on the ground.

The dismounted warrior is a primary element in the Army's non-negotiable contract with the American people to protect our Nation's interests. These interests may range from peacekeeping, to support and stability operations, to full-scale war. Therefore, the equipment and supplies worn, carried, or consumed by the dismounted warrior are a key Army priority.

A View Of The OFW

The future OFW will fight as a team with unparalleled capabilities. To achieve overwhelming overmatch, the OFW must apply a new fighting paradigm—see first, understand first, act first, and finish decisively.

- *See First.* The OFW must first see the enemy by detecting, identifying, and tracking him.
- *Understand First.* With a common operating picture of the battlefield enabled by seeing first, the OFW will have an unprecedented capability to understand what the enemy is doing and better anticipate his actions.
- *Act First.* Seeing and understanding first will give the OFW the situational dominance necessary to act first—to engage at times, places, and with methods of his own choos-

ing. This will allow informed decisionmaking at the lowest levels, yielding an operational tempo able to operate inside the opponent's decision cycle.

- *Finish Decisively.* Enabled by the ability to see first, understand first, and act first, the OFW will apply enhanced agility and overwhelming lethality to destroy the enemy's ability to fight.

The OFW vision requires a "system-of-systems" approach integrating lethality; command, control, communications, computers, intelligence (C4ISR); survivability; agility; and sustainment. The OFW must employ state-of-the-art solutions rigorously integrated through sophisticated system architecture. Aggressive application of analysis and modeling and simulation will be required to support the system-of-systems trades necessary to ensure optimal OFW performance at minimal weight, cost, and delay. Additionally, the OFW will use open system architecture to allow continuous incorporation of new technologies. This approach will ensure our dismounted warriors have the latest capabilities integrated into their systems and are not waiting on the integration of multiple improvements via a block upgrade.

Our future OFW will not fight with yesterday's technologies against an enemy capable of applying the

latest commercial capabilities. The OFW will have collaborative access to organic and joint-netted fires providing line-of-sight and beyond-line-of-sight fires on the move. The OFW will have access to a common operating picture of the battlefield through a combined sensor and robust communication system that also provides collaborative planning and rehearsal capabilities. The OFW will be capable of operating for 72 hours without resupply with connectivity to FCS. The OFW will also enjoy unprecedented survivability, enabled not only by better situational understanding, but also by an integrated combat suit that provides full-spectrum protection.

Technology Options

The leap-ahead capabilities anticipated for the OFW will be enabled through technology developments in five primary focus areas: lethality, survivability, knowledge, agility, and sustainment. Examples of technology opportunities in these areas follow.

Lethality. The OFW must provide individuals the capability to detect, identify, and kill targets throughout the full spectrum of military operations under all operational environments. To achieve this will require development of systems to allow access and application of the lethal assets from within the squad and higher echelons, a family of lightweight direct and indirect fire soldier weapons, and nonlethal capabilities.

Survivability. The future dismounted warrior will be exposed to threats intended to create casualties or significantly reduce performance. These threats will be from ballistic, blast, directed energy, fire/incendiary, chemical/biological, nuclear, physiological, environmental, and vibration/impact sources. In response to these threats, the OFW must provide effective protection under all battlefield conditions and the ability to see the enemy first, avoid exposure, and mitigate consequences. Key technology elements are as follows:

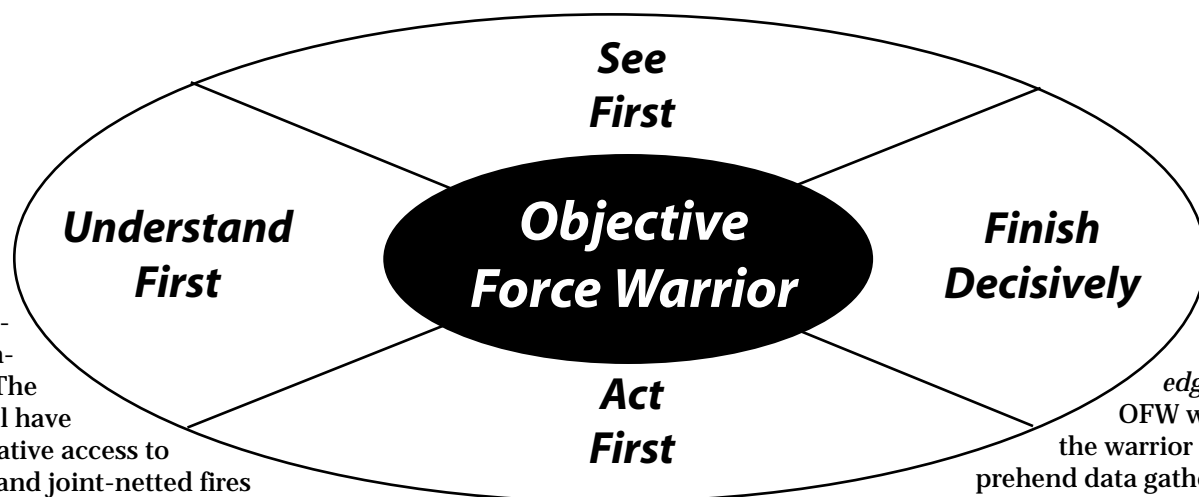
- Advanced sensors will allow the OFW to see the enemy first across a full spectrum of battlefield environments with emphasis on urban terrains.
- A lightweight soldier suit will integrate signature management, chemical and biological weapon protection, advanced lightweight armor, physiological monitoring, and casualty care. The Institute for Soldier Nanotechnologies is a major Army initiative for achieving this capability.
- A personal thermal management system (microclimate conditioning) will allow operation in all environmental conditions.

Knowledge. The OFW will enable the warrior to comprehend data gathered through the Objective Force C4ISR system and quickly evaluate possible actions and their outcome. Specifically, the OFW will have a nearly complete picture of the battlefield and the tools to rapidly exchange critical information across the full spectrum of military operations. The information-enabled warrior requires on-demand connectivity and decisionmaking capability. Key technology elements are as follows:

- Miniaturized, rugged, networked squad radio;
- Data visualization tools;
- Systems for near real-time soldier information processing systems; and
- Advanced decisionmaking tools and software "intelligent agents."

Agility. The OFW must have unprecedented agility with enhanced human performance. A specific goal is to reduce the weight carried by the dismounted warrior to 40 pounds or less. Key technology elements include the following:

- Approaches to offload, lighten, and assist the warrior to include leverage of the Defense Advanced Research Projects Agency's (DARPA's) exoskeleton program and semi-autonomous robotic mules;
- Warfighting simulations and virtual prototypes of warrior systems;



- Enhanced warrior performance through human modeling and pharmacological advances; and
- Embedded and small-unit leader training capabilities.

Sustainment. Both the physical and mental health of the OFW are important in addition to an autonomous ability to sustain the individual warrior across the spectrum of battlefield conditions. Specifically, the OFW must provide for 72-hour organic sustainment capability supplemented by an emergency resupply system. Key technology elements include:

- Compact soldier high-power systems through leveraging of DARPA's Palm Power Program,
- Water generation and purification methods, and
- Novel materiel delivery systems to provide never-late, warrior-specific resupply.

Strategy

The warfighter is central to the Objective Force, and the transition of OFW technologies and capabilities requires integration with FCS. To coordinate with FCS milestones, the OFW effort will be pursued in two separate science and technology (S&T) phases, the first occurring from FY02 through FY06 and the second from FY07 to FY11.

The FY02-06 phase will be pursued through the execution of two parallel program elements. The first will be a system-of-systems concept design of the OFW using up to two lead system integrators. This program element will evolve through a concept exploration phase to preliminary system design, and then to system prototyping and demonstration. The second program element will be the pursuit of high-risk, high-payoff technologies and component devel-

opment. Both program elements will be initiated in FY02 and continue until transition to system development and demonstration (SDD) activities in 2006. These activities will likely be followed by low-rate initial production and fielding beginning in the 2010 period. This schedule aligns OFW production with FCS Block I production.

The second phase of the OFW Program begins in 2007 with a planned transition to SDD in 2011. This phase will integrate and demonstrate technologies that are currently in the early stages of research (for example, exoskeleton and microclimate-conditioning technologies) and require further development to determine their potential contribution to the OFW. The Phase II schedule is structured to coincide with that of the FCS block upgrade.

Conclusion

Nearly 85 percent of all U.S. casualties in World War II, in Korea, and in Vietnam were inflicted on our dismounted warriors. The Army's S&T community, through development of the OFW, fully expects a different result on future battlefields. That result will be an unfair fight that significantly favors the U.S. Army warrior.

Note: *The Institute for Creative Technologies, in collaboration with the Office of the Deputy Assistant Secretary of the Army for Research and Technology, has produced a digital video disk (DVD) to dramatize a visionary concept for a revolutionary approach to the Objective Force Warrior. The DVD depicts a series of dismounted warrior vignettes set in the 2015 timeframe and illustrates leap-ahead warfighting capabilities that may be in the realm of possibility. Information about the DVD can be obtained by contacting ofwvideo@saalt.army.mil.*

DR. A. MICHAEL ANDREWS II is the Deputy Assistant Secretary of the Army for Research and Technology and Chief Scientist of the Army. Before coming to the Pentagon in 1997, Andrews was a senior executive at Rockwell International Corp., with leadership experience in technology development, business management, and strategic planning. He holds a Ph.D. in electrical engineering from the University of Illinois and M.S. and B.S. degrees in electrical engineering from the University of Oklahoma. He has 5 patents and 49 publications, and he is a recipient of Rockwell's Engineer of the Year Award.

DR. PAMELA BEATRICE is the liaison for the U.S. Army Soldier and Biological Chemical Command (SBCCOM) in the Office of the Deputy Assistant Secretary of the Army for Research and Technology. She holds a doctoral degree in materials science and engineering from the University of Pennsylvania.

PHILIP BRANDLER is the Director of the Natick Soldier Center at SBCCOM, Natick, MA. He has a bachelor's degree in physics from Columbia University and advanced degrees in physics, industrial engineering and operations research, and business administration. He is a member of the Army Acquisition Corps.

ROY COOPER is a Consultant with Information International Associates, Oak Ridge, TN. He previously served as the Special Assistant to the Deputy Assistant Secretary of the Army for Research and Technology and the Chief Scientist of the Army.
